PHASE III GROUNDWATER INVESTIGATION REPORT

HIMCO SITE
ELKHART, INDIANA

Prepared For:
Himco Site Trust

Prepared by:
Conestoga-Rovers & Associates

651 Colby Drive
Waterloo, Ontario
Canada N2V 1C2

Office: (519) 884-0510
Fax: (519) 884-0525

web: http://www.CRAworld.com

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1.0 INTRODUCTION

1.1 PURPOSE

This report documents the Phase III Groundwater Investigation completed at the Himco Site, located in Elkhart, Indiana (Site). Conestoga-Rovers & Associates (CRA) completed the investigation on behalf of the Performing Settling Defendants (PSDs), collectively known as the Himco Site Trust.

The Himco Site is a National Priorities List (NPL) site that is being remediated pursuant to a Consent Decree (Civil Action No. 2:07cv304 (TS)) (CD). The Statement of Work (SOW), included as Appendix B of the CD, specified the Remedial Action (RA) requirements for the Site. The SOW requires groundwater investigations to the east and southeast of the Himco Site and the implementation of a Groundwater Monitoring Program. CRA, on behalf of the PSDs, prepared a Remedial Design Work Plan (CRA, 2008) that combined the East and Southeast Groundwater Investigations and the Groundwater Monitoring Program into a three-Phase Groundwater Investigation that builds incrementally to address the groundwater investigation and monitoring requirements of the SOW.

The Phase III Groundwater Investigation included the installation of nine new monitoring wells in 2011. This report presents the borehole logs, monitoring well installation details, and geologic cross-sections for Phase III wells. Analytical data for the Phase III wells will be presented in the Second Annual Groundwater Monitoring Report scheduled for submittal to USEPA in November 2011.

1.2 BACKGROUND

The Site is a closed unlicensed landfill located at the intersection of County Road 10 and the John Weaver Parkway (formerly Nappanee Street Extension) in Cleveland Township, Elkhart County, Indiana. The Site is approximately 60 acres in size, and accepted waste such as household refuse, construction rubble, medical waste, and calcium sulfate between 1960 and 1976. The landfill was closed in 1976.

Figure 1.1 shows the Site location. Figure 1.2 shows the layout of the Site, including property boundaries.

The Site consists of two major areas: the landfill, which is covered with calcium sulfate and a layer of sand, and the 4 acre construction debris area (CDA), located on the

northern portion of seven residential properties and one commercial property that front onto County Road 10.

The Site was proposed for the NPL in 1988 and was placed on the NPL in 1990. The Remedial Design/Remedial Action (RD/RA) is being conducted pursuant to the CD, which became effective on November 27, 2007. The lead Agency for the Site is the United States Environmental Protection Agency (USEPA) Region 5. The Indiana Department of Environmental Management (IDEM) is the support Agency.

Section II, Paragraph 4.3 of the SOW describes the requirements for the groundwater investigation east and southeast of the Site. The purpose of the investigation is to characterize the nature and extent of Site-related contamination that potentially may be impacting the adjacent aquifer and water supply wells, and to refine the current understanding of groundwater flow. The East and Southeast Groundwater Investigation and the Groundwater Monitoring Program were combined. Information regarding groundwater quality and groundwater flow directions from both areas is useful for interpreting local hydrogeologic conditions.

Section II, Paragraph 5 of the SOW describes the requirements for the Groundwater Monitoring Program intended to characterize the nature and extent of groundwater contamination beneath the Site. Section II, Paragraph 5.1 of the SOW states that the PSDs "will submit a groundwater monitoring plan as part of the RD Work Plan, which will address the frequency of sampling, the wells to be sampled, and laboratory analyses to be performed." The SOW also requires that the wells be segregated into wells for detection monitoring and wells for compliance monitoring. Paragraph 5.1.4 further states that "all groundwater wells associated with the Site shall be monitored for 10 years, but that an alternate schedule may be used if approved by USEPA."

The objectives of the groundwater investigations are to:

- Delineate the horizontal and vertical extent of groundwater impact from the Site around the perimeter of the Site
- Delineate the plume contaminating the residential well at 54305 Westwood Drive, immediately east of the Site
- Delineate an appropriate buffer zone east of the Site
- Delineate groundwater contaminants that may have migrated south of the Site
- Provide information required to design an appropriate monitoring well network

The Phase I Groundwater Investigation was the first stage of data collection and analysis and consisted of the following tasks:

- Historic data compilation
- Monitoring well reconnaissance and survey
- Baseline groundwater sampling
- Vertical Aquifer Sampling (VAS)

CRA used VAS techniques during the Phase I Groundwater Investigation to characterize the variations in contaminant distribution with depth in the thick sand aquifer sequence underlying the Site. CRA used VAS at the Site to address this data gap and to ensure that any new monitoring wells are installed to the appropriate depths.

CRA completed the groundwater investigation at the Site in phases based on the portion of the Site under investigation and the target depths of the investigation. A phased approach permitted information to be collected during the initial stages of the investigation that would guide the subsequent phases of the investigation. The Phase I Groundwater Investigation included VAS at selected monitoring well locations to investigate the horizontal and vertical extent of groundwater contamination to a depth of approximately 150 feet below ground surface (ft bgs). CRA collected hydraulic monitoring data during the Phase I Groundwater Investigation to evaluate the groundwater flow regime in the vicinity of the Site and to guide future plume delineation. CRA also completed groundwater sampling of the existing wells to characterize groundwater quality beneath the Site.

The Phase II Groundwater consisted of the following tasks:

- Additional VAS
- New monitoring well installation

The Phase I Groundwater Investigation VAS focused on the southern and eastern edges of the Site and downgradient areas to the south, southeast, and east, and was limited to 150 feet in depth. Monitoring wells were installed at the Phase I VAS locations during the Phase II Groundwater Investigation. The VAS portion of the Phase II Groundwater Investigation focused on the southeast corner of the Site and downgradient to the south east. The target depth of some of the Phase II VAS boreholes was bedrock, to investigate hydrogeologic conditions beneath the bottom depth of the Phase I VAS. The results of the Phase II Groundwater Investigation refined the horizontal and vertical delineation of any plumes at the Site, and improved the definition of background groundwater quality.

The Phase III Groundwater Investigation monitoring wells completed the monitoring well network.

CRA has completed the following routine groundwater quality monitoring rounds at the Site to date:

- Baseline Groundwater Sampling (Q1) - October 28 to November 19, 2008
- Interim Groundwater Monitoring Program (Q2) - February 9 to February 19, 2009
- Interim Groundwater Monitoring Program (Q3) - April 29 to May 6, 2009
- Interim Groundwater Monitoring Program (Q4) - August 4 to August 18, 2009
- Interim Groundwater Monitoring Program (Q5) - November 3 to November 11, 2009
- Interim Groundwater Monitoring Program (Q6) - February 23 to March 4, 2010
- Interim Groundwater Monitoring Program (Q7) - June 15 to June 24, 2010
- Interim Groundwater Monitoring Program (Q8) - September 8 to September 15, 2010
- Interim Groundwater Monitoring Program (Q9)- December 6 to December 16, 2011
- Interim Groundwater Monitoring Program (Q10)- March 7 to March 18, 2011
- Interim Groundwater Monitoring Program (Q11)- June 13, 2011 to June 24, 2011

The Phase I Groundwater Investigation report (CRA, 2009) previously provided the results of the Q1 and Q2 sampling events. CRA evaluated the data from the next four quarterly monitoring events, Q3 through Q6, in the Himco Annual Groundwater Monitoring Report (CRA, 2010). CRA also evaluated trends in the groundwater quality data and calculated background concentrations for metals and general chemistry parameters. The Himco Annual Groundwater Monitoring Report (CRA, 2010) includes statistical evaluations of the trends in groundwater quality data based on Q1 through Q6 results. The Phase II Groundwater Investigation report (CRA, October 2010) presents the results of the Q7 round of the Interim Groundwater Monitoring Program, which includes the initial groundwater samples from the Phase II monitoring wells installed in May 2010. The Interim Groundwater Monitoring Report (CRA, April 2011) includes an evaluation of the results of the Q8 round of the Interim Groundwater Monitoring Program and CRA's recommendations for future groundwater quality monitoring in the vicinity of the Site. Pending USEPA approval of the Interim Groundwater Monitoring Program Report (CRA, April 2011), and the proposed reduced monitoring frequency, the PSDs have continued quarterly groundwater monitoring. The results for the Q9, Q10, and the Q11 monitoring rounds will be discussed in the Second Annual Monitoring Report.

2.0 PHASE III GROUNDWATER INVESTIGATIVE ACTIVITIES

2.1 PHASE III MONITORING WELL INSTALLATION

Figure 1.2 shows the locations of the monitoring wells installed during the Phase III Groundwater Investigation. Stearns Drilling Company (Stearns) of Dutton, Michigan, provided drilling services. Table 2.1 summarizes the Phase III monitoring well completion details and the status of other monitoring wells in the vicinity of the Site.

CRA based the design of the Phase III monitoring wells on the Phase II VAS results, and installed the wells in accordance with the recommendations provided in the Phase II Groundwater Investigation Report (CRA, 2011) approved by USEPA on March 9, 2011. Stearns installed the Phase III monitoring wells using the hollow stem auger (HSA) drilling method and the rotosonic drilling method, and followed the installation procedures provided in Section 2.3.2.1 and Section 2.3.2.2 of the USEPA-approved Field Sampling Plan (FSP) (CRA, October 2008). Stearns also completed the well development in accordance with Section 2.3.3 of the FSP (CRA, October 2008) procedures. CRA surveyed the Phase III monitoring wells in accordance with Section 2.1.1 of the FSP (CRA, October 2008). Stearns installed the Phase III monitoring wells between February 22 and March 31, 2011. The Phase III monitoring wells were developed on March 1, 2011 and the development details are provided in Table 2.2.

The monitoring wells consist of a 5-foot-long, 2-inch-diameter polyvinyl chloride (PVC) well screen connected to a 2-inch-diameter PVC riser pipe. The well screen slot size is 0.010 inches. The monitoring wells were installed inside a nominal 6-inch-diameter borehole. No. 1 K&E silica sand was placed around the well screen and a bentonite slurry was used to seal the remaining borehole annulus. Stratigraphic and instrumentation logs for the Phase III monitoring wells are provided in Appendix A.

2.2 PHASE III GROUNDWATER INVESTIGATION WELLS

The Phase I and Phase II Groundwater Investigations have met the objectives of the groundwater investigation through historic data compilation, VAS, new monitoring well installations, routine groundwater monitoring, and detailed review of the data set. The Phase III monitoring wells complete the delineation of contaminants south and southeast of the Site, and confirm the groundwater flow direction southeast of the Site.

The location of the Phase III monitoring wells and corresponding cross-sections are shown on Figure 3.1. The Phase III wells are also depicted on cross-sections provided on Figures 3.2 through 3.5.

The following monitoring wells were installed during the Phase III Groundwater Investigation:

Well Name	*Aquifer*	*Rationale*
WT106C	Lower Aquifer	Maximum metals concentration
WT115B	Upper Aquifer	Maximum benzene concentration
WT115C	Intermediate Aquifer	Sentry monitoring well
WT120C	Upper Aquifer	Delineate groundwater flow
WT121A	Upper Aquifer	Delineate groundwater flow
WT121B	Intermediate Aquifer	Maximum metals concentration
WT122A	Upper Aquifer	Replacement well for WT105A
WT122B	Intermediate Aquifer	Maximum metals concentration
WT122C	Intermediate Aquifer	Maximum metals concentration

CRA installed VAS105 as part of the Phase I investigations on a property south of the Site to investigate groundwater quality in the Intermediate Aquifer and delineate groundwater contaminants that may have migrated south of the Site. Subsequently, the property owner (Mr. Alonzo Craft Jr.) denied the PSDs access to his property to install additional permanent monitoring wells. He agreed to allow permanent monitoring wells on his property if they were located in the right-of-way for County Road 10. In USEPA's June 24, 2010 approval of the revised well locations, USEPA requested that CRA evaluate the elevation of the proposed WT122 monitoring wells against the groundwater screening data collected from Phase II borehole VAS115, the closest VAS borehole to the proposed WT122 well locations. CRA provided this evaluation to USEPA in an email correspondence dated August 11, 2010. Peak concentrations of metals observed in groundwater samples collected from VAS105 across the Intermediate Aquifer were not present in groundwater samples collected from VAS115. Two new Intermediate Aquifer wells, WT122B, and WT122C, were installed at the location north of WT105A at the depths corresponding to the primary and secondary metals peaks in groundwater samples collected at 659 feet above mean seal level (AMSL) and 699 feet AMSL in VAS 105.

As summarized in CRA's May 13, 2010 email correspondence to USEPA, Mr. Craft also required, as a condition to obtaining access, that the PSDs abandon well WT105A, and limit any replacement well to a location within the right-of-way for County Road 10. WT105A was abandoned on March 1, 2011. As summarized in CRA's May 13, 2010

correspondence, replacement of WT105A with a new well, WT122A, at the location shown on Figure 3.1, does not diminish the ability to monitor shallow groundwater quality and movement south and downgradient of the Site. Although the proposed well, WT122A, is approximately 200 feet closer to the Site than WT105A, well nests WT106 or WTE (see Figure 1.2) may act as sentry well(s) to monitor the downgradient edge of the contaminant plume.

3.0 FUTURE GROUNDWATER MONITORING AND REPORTING

The Phase III monitoring wells are designed to provide groundwater quality data to vertically delineate volatile organic compounds (VOCs) in groundwater beneath the Site, and further investigate metals concentrations in potential preferential migration pathways identified by the Phase II VAS results.

CRA collected the first round of samples from the Phase III monitoring wells in March 2011. Quarterly samples will be collected from the Phase III monitoring wells until December 2011 and will be analyzed for the analytes listed in Table 4.1. This sampling frequency will provide four rounds of quarterly groundwater quality monitoring data for the Phase III monitoring wells. The frequency of sampling will subsequently be reduced to a semi-annual basis, as indicated in the Interim Groundwater Monitoring Report (CRA, April 2011). Future groundwater quality monitoring will be based on the results of the four quarterly monitoring rounds.

The PSDs will submit routine annual reports of groundwater quality monitoring at the Site. The next groundwater monitoring report will be submitted to USEPA in November 2011 and will include monitoring data collected from December 2010 through June 2011.

4.0 REFERENCES

Conestoga-Rovers & Associates, November 2008. Remedial Design Work Plan, Himco Site, Elkhart, Indiana.

Conestoga-Rovers & Associates, October 2008. Remedial Design Work Plan

Appendix A Field Sampling Plan, Himco Site, Elkhart, Indiana.

Conestoga-Rovers & Associates, May 2009. Phase I Groundwater Investigation, Himco Site, Elkhart, Indiana.

Conestoga-Rovers & Associates, September 2010. Himco Annual Groundwater Monitoring Report, Himco Site, Elkhart, Indiana.

Conestoga-Rovers & Associates, October 2010. Phase II Groundwater Investigation Report, Himco Site, Elkhart, Indiana.

United States Environmental Protection Agency, December 2002. Supplemental Site Investigations/Site Characterization Report, Himco Dump Superfund Site, Elkhart, Indiana.

TABLE 2.2

PHASE III GROUNDWATER MONITORING WELL DEVELOPMENT DETAILS
HIMCO SITE
ELKHART, INDIANA

Well	*Date*	*Depth to Water (ft BTOR)*	*Depth to Well Bottom (ft BTOR)*	*Well Volume (gallons)*	*Volume Purged (gallons)*	*Turbidity (NTU)*
WT115B	3/1/2011	12.65	31.22	3	100	4.97
WT115C	3/1/2011	12.46	71.42	10	100	2.81
WT120C	3/1/2011	8.82	16.85	1	50	4.14
WT122A	3/1/2011	9.59	25.02	3	50	3.83
WT122B	3/1/2011	9.65	62.92	9	100	3.91
WT122C	3/1/2011	9.42	102.52	15	150	2.73

Note:

BTOR- below top of riser